

Author Affiliations Presenting Lemoine F NASA Goddard Space Flight Center

Chinn D SGT Inc., Le Bail K NVI Inc., Zelensky N SGT Inc., Melachroinos S SGT Inc., Beall J Raytheon Mission Operations and Services

TITLE: Weekly Solutions of Time-Variable Gravity from 1993 to 2010

The GRACE mission has been highly successful in determining the time-variable gravity field of the Earth, producing monthly or even more frequent solutions (cf. 10-day) solutions using both spherical harmonics and mascons. However the GRACE time series only commences in 2002-2003 and a gap of several years may occur in the series before a GRACE follow-on satellite is launched. Satellites tracked by SLR and DORIS have also been used to study time variations in the Earth's gravitational field. These include (most recently) the solutions of Cox and Chao (2002), Cheng et al. (2004, 2007) and Lemoine et al. (2007). In this paper we discuss the development of a new time series of low degree spherical harmonic fields based on the available SLR, DORIS and GPS data. We develop simultaneous solutions for both the geocenter and the low degree harmonics up to 5x5. The solutions integrate data from SLR geodetic satellites (e.g., Lageos1, Lageos2, Starlette, Stella, Ajisai, Larets, Westpac), altimetry satellites (TOPEX/Poseidon, Envisat, Jason-1, Jason-2), and satellites tracked solely by DORIS (e.g. SPOT2-5). We discuss some pertinent aspects of the satellite-specific modeling. We include altimeter crossovers in the weekly solutions where feasible and time permits. The resulting geocenter time series is compared with geophysical model predictions and other independently-derived solutions. Over the GRACE time period the fidelity and consistency with the GRACE solutions are presented.